

10B DATA LINE CONCENTRATOR MAINTENANCE

1. GENERAL

- 1.01** This section covers the procedures to be followed when a trouble condition in the Data Line Concentrator System has been isolated to the 10B Data Line Concentrator, as described in the section entitled Data Line Concentrator System—Maintenance (591-810-300). In the following text, the word "module" will refer to a functional unit such as a data mounting equipped with its associated circuit packs.
- 1.02** The following procedures assume the reader has a general familiarity with the operation and physical arrangement of the concentrator. This information is found in the section entitled 10B Data Line Concentrator—Description (591-811-101).
- 1.03** There is no routine maintenance required for any of the modules which make up the concentrator. When a trouble condition is found to exist, repair is achieved by the replacement of the defective unit (ie, circuit pack, data mounting, etc).
- 1.04** Testing procedures for a concentrator suspected of being in trouble, or where a defective unit has been replaced, should be performed in accordance with the section entitled 10B Data Line Concentrator—Test Procedures (591-811-501).
- 1.05** The tests referred to in the text and troubleshooting flowcharts of this section (eg, Test A, Test B) should be performed in accordance with the test section referenced in 1.04.
- 1.06** Removal of defective units and installation of replacement units should be in accordance with the section entitled 10B Data Line Concentrator—Installation and Connections (591-811-201).
- 1.07** Exercise care in handling and transporting circuit packs, data mountings, etc. If possible, use original cartons to store, transport, or ship all units.
- 1.08** If maintenance spare are stocked, verify that they are checked and ready for immediate installation.
- 1.09** It is recommended that the following circuit packs be stocked as maintenance spares.
- (a) One AR489 clock (essential)
 - (b) One FP1 pulser (essential)
 - (c) One AR490 alarms and registers (optional)
 - (d) One AR383 dual access line scanner (essential)
 - (e) One AR376 dual access line scanner (essential)
 - (f) One AR597 camped-on signal generator (essential)
 - (g) One AR377 dual access control circuit (essential)
 - (h) One AR488 trunk circuit A for every five trunk circuits required in trunk group A (essential)
 - (i) One AR382 trunk circuit B for every five trunk circuits required in trunk group B (essential)
 - (j) One AR366 line circuit for every five line circuits required in the concentrator (essential)
 - (k) One AR381 dc/dc converter (essential)
 - (l) One AR464 manual test circuit (essential).
- 1.10** It is also recommended that one KS-20575-L1 rectifier be kept at the concentrator, one at the multiple data set arrangement for the port, and one at the interconnection arrangement site as maintenance spares.

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2. MAINTENANCE AIDS

2.01 The following circuit description (CD), schematic drawing (SD), and Bell System Practices (BSPs) may be useful as maintenance aids when troubleshooting a defective concentrator.

SD- & CD-1D212-01 Data Systems Station—No. 10B
Data Line Concentrator

591-810-300 10-Type Data Line Concentrator
System—Maintenance Procedures

591-811-201 10B Data Line Concentrator—
Installation

591-811-501 10B Data Line Concentrator—Test
Procedures.

2.02 A KS-14510-L1 (or equivalent) volt-ohm-milliammeter (VOM) may be required for the performance of these maintenance procedures.

3. MAINTENANCE ACTIVITIES

3.01 This part describes the procedures to be followed when attempting to isolate a multiple station or single station reported trouble in the concentrator.

3.02 Troubles within the concentrator can generally be isolated to one of four areas by analyzing the trouble report. These areas and the symptoms which indicate trouble in them are as follows:

Multiple Station Reported Troubles

(a) Access troubles (Fig. 1)—

(1) Line scanner (LS), trunk scanner (TS), clock (CLK), and/or pulser (PLSR) alarm lamps on AR490 circuit pack lighted.

(2) All stations in system report inability to establish a connection to either trunk group.

(b) Trunk circuit troubles (Fig. 2)—

(1) A number of stations report occasional lack of answer-back and camp-on when a service request is made for either trunk group A or trunk group B.

(2) A number of local stations report that teletypewriter (TTY) occasionally runs open when a service request is made for either trunk group A or trunk group B.

(3) The computer tabulation (if available) of port usage indicates that one or more ports have a much lower usage than most of the other ports.

(4) A number of stations repeatedly report an unusually long camp-on before being connected to a trunk in either trunk group A or trunk group B.

Single Station Reported Troubles

(c) Line circuit troubles (Fig. 3)—

(1) Station reports no answer-back or camp-on when a service request is made to trunk group A or B.

(2) Local station reports that TTY runs open when a service request is made to trunk group A or B.

(3) Station receives permanent camp-on for service requests to trunk group A or B.

(d) Switching matrix network troubles (Fig. 4)—

(1) Station reports occasional lack of response when a service request is made to either trunk group A or trunk group B.

(2) Local station reports that TTY occasionally runs open when a service request is made to either trunk group A or trunk group B.

3.03 Once a trouble has been localized to a particular area, it is recommended that all power supplies, fuses, and connector cables be checked first. Then the troubleshooting flowcharts (Fig. 1, 2, 3, and 4) are to be used for an organized trouble investigation with a minimum amount of time spent in locating the cause of trouble.

Caution: *When a data mounting pulser circuit pack (FP1), or AR381 circuit pack must be replaced, power to the concentrator should be turned off to prevent damage to the other units. This will cause all calls that have been connected to disconnect.*

Therefore, a customer release of the services MUST be obtained. In addition, it is preferable to perform this action during the low traffic hour.

3.04 When a trouble has been isolated to a particular circuit pack, data mounting, etc, and that unit is replaced, repeat the test of the unit to determine if the trouble is cleared. Then have the station(s) reporting the trouble request service to verify that the trouble is cleared.



The following paragraphs (3.05 through 3.10) are to be referred to when using Fig. 1, 2, 3, or 4 for troubleshooting. Instructions on these figures refer to these paragraphs.

3.05 When an alarm lamp on the AR490 circuit pack is lighted, replace the control module circuit packs as follows.

(a) PLSR lamp lighted—First replace AR489 (slot 05). If the PLSR lamp remains lighted, replace FP1 circuit pack (behind cover plate in center of 23B1 Data Mounting). If the alarm lamp is still lighted, replace the AR490 circuit pack (slot 07). If after replacing the AR489, FP1, and AR490 circuit packs the alarm lamp is still lighted, the 23B1 Data Mounting should be replaced.

(b) CLK lamp lighted—Replace AR489 (slot 05) clock card. (If the LS and TS lamps are also lighted, replacing the AR489 circuit pack first may cause the other lamps to extinguish)

(c) Both LS and TS lamps lighted—Check output of AR381 dc/dc converter circuit pack (slot 01) as follows:

- (1) Condition VOM to measure 4.5 volts dc.
- (2) Connect negative VOM lead to a good signal ground.
- (3) Connect positive VOM lead to TP14 or AR381.

Requirement: Meter indicates between 4.2 and 4.8 volts dc.

If the above requirement is *not* met, replace AR381.

If the above requirement *is* met, replace AR377 (slot 21) dual access control circuit.

If both lamps remain lighted, replace AR376 dual access trunk scanner (slot 19) **and** AR383 (slot 17) dual access line scanner.

- (d) LS lamp only lighted—Replace AR383. If lamp remains lighted, replace AR377.
- (e) TS lamp lighted—Replace AR376. If lamp remains lighted, replace AR377.

3.06 When a line has been connected to a trunk and that connection meets the requirements of Test B (see 1.05), connect the line to the next trunk and repeat Test B until the faulty crosspoint is detected. If all the crosspoints for the line in trouble meet the requirements of Test B, the trouble may be caused by an excess of line padding in the interconnection arrangement concentrator-side data set or local station data set.

3.07 In order to determine if the concentrator is continuously pulsing, condition the VOM to measure 24 volts dc, connect the negative VOM lead to a good signal ground, and connect the positive VOM lead to TP12 of the AR489 circuit pack. The meter should indicate 18 to 24 volts dc with a negative voltage spike present each time the concentrator pulses.

3.08 If the meter indicates the concentrator is continuously pulsing, replace the AR489 and AR377 circuit packs and recheck for the continuous pulsing. If the pulsing circuit persists, replace the FP1 circuit pack and again recheck for pulsing. If the continuous pulsing *still* persists, remove the line circuits from the line and switch module (18A1, 19A1, or 20A1 Data Mounting), as follows:

- (1) While monitoring for the presence of continuous pulsing, ensure that both lines served by the line circuit are idle and then remove that line circuit from the data mounting.
- (2) Repeat (1) for each line circuit, in turn, until the continuous pulsing stops.
- (3) Replace the line circuit that was removed immediately preceding the cessation of the pulsing with one that is known to be operating properly.

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- (4) Still monitoring for the continuous pulsing, reinstall the line circuits one at a time.
- (5) If the continuous pulsing returns after the reinstallation of a line circuit, replace that line circuit with one that is known to be operating properly.

If after removing all of the line circuits the continuous pulsing is still present, replace the 23B1 Data Mounting (control module).



If the trouble is in the line circuits and it is found to be a recurring problem (ie, this happens on more than one occasion), there is probably a defective component on the 23B1 Data Mounting and this mounting should be replaced with one that is known to be operating properly.

3.09 If a computer center tabulation of the trunk usage traffic pattern is available, it should be analyzed to determine:

- (a) If any trunk(s) in either trunk group have a much lower usage rate than the other trunk in that trunk group.
- (b) If any trunk(s) in either trunk group are continuously having a much shorter holding time than the other trunks in that group.

If either (a) or (b) is evident, troubleshooting should be continued with the low usage or short holding time trunk(s) as described in Fig. 2.

3.10 If a computer center tabulation of the trunk usage traffic pattern is not available, one of the following three procedures may be used to make a tabulation at the concentrator. These procedures are to be performed with the trunk circuits associated with the trunk group that appears to have the faulty trunk (AR488 for trunk group A; AR382 for trunk group B).

- (a) This procedure requires the use of a KS-14510-L1 VOM, or equivalent, and should be made during the busy hour.

- (1) Connect negative VOM lead to TB2-3 of the 21B1 or 22B1 Data Mounting.

- (2) Connect positive VOM lead to TP10 of the AR488 or AR382 circuit pack to be monitored for status.

Note: When the trunk circuit is in use (connected to a line), the meter will indicate zero or near zero volts.

- (3) Monitor the trunk circuit and note whether it is in use and how long it remains in use.

- (4) Repeat (2) and (3) for each trunk circuit in the trunk group being tested.

- (5) Troubleshooting should be continued as described in Fig. 2 with any trunk circuit(s) found to have a much shorter holding time than the others in the group or appear to be used less often than the others in that group.

- (b) This procedure requires the use of a KS-14510-L1 VOM, or equivalent, and should be performed during the nonbusy hour.



This procedure requires that trunk circuits be taken out of service for maintenance purposes. If local policy prescribes that this NOT be done, this procedure should be omitted. If this procedure IS to be done, a customer release of the service MUST be obtained.

- (1) Connect negative VOM lead to TB2-3 of the 21B1 or 22B1 Data Mounting.

- (2) Determine whether the first trunk circuit in the trunk group being tested is idle by checking TP10 of the trunk circuit in the lowest numbered slot. If the trunk is idle, remove the circuit pack from the data mounting. If not, leave it in place.

Note: TP10 of busy trunk circuits will be at or near zero volts.

- (3) Repeat (2) with all other trunks in the trunk group being tested.

- (4) Replace one of the AR488 or AR382 circuit packs that were removed from the data mounting and monitor it to see that it is eventually used.

- (5) Repeat (4) until all trunk circuits have been reinstalled or replaced. Troubleshooting should be continued as described in Fig. 2 with any trunk circuit which does not become used or which has an extremely short holding time.
- (c) This procedure requires the availability of a model 33- or 35-type TTY equipped with a Data Set 109-type, and an unused line circuit at the concentrator. In addition, a KS-14510-L1 VOM, or equivalent, and the manual test set (DAS 803E1 and AR464 CP are required).
- (1) At the intermediate distribution frame (IDF) or connector block for the concentrator line circuits, connect the TTY to the unused line circuit.
 - (2) Connect the negative VOM lead to TB2-3 of the 21B1 or 22B1 Data Mounting.
 - (3) Operate the LINE 1 or LINE 2 button to request service to the trunk group being requested, note which trunk circuits are busy, and then turn off the TTY.
- Note:** Use positive VOM leads to check TP10 of trunk circuits. Busy trunk circuits will have TP10 at or near zero volts.
- (4) Repeat (3) for 10 to 15 minutes.
 - (5) If any trunk circuits are found to which a connection cannot be made, use the manual test set to connect the TTY line to that trunk circuit.
 - (6) Turn on the TTY. If the TTY runs open, it is not seeing a proper termination from the trunk loop and troubleshooting should be continued as described in Fig. 2 with all trunks with which this happens.
 - (7) If the TTY does not run open, disconnect the manual test set from the line and trunk circuits. If the connection does not hold up, the trunk circuit is not good and should be replaced.
 - (8) If the connection holds up, repeat (3) for approximately 5 minutes. If the trunk still does not get used, replace the trunk circuit (AR488 or AR382).
 - (9) Repeat (3) for approximately 5 minutes and if the new trunk circuit does not get used, replace the trunk scanner (AR376—slot 19 of the 23B1 Data Mounting).
 - (10) Repeat (3) for approximately 5 minutes. If some of the trunks still do not get used, continue troubleshooting these trunks as described in Fig. 2.

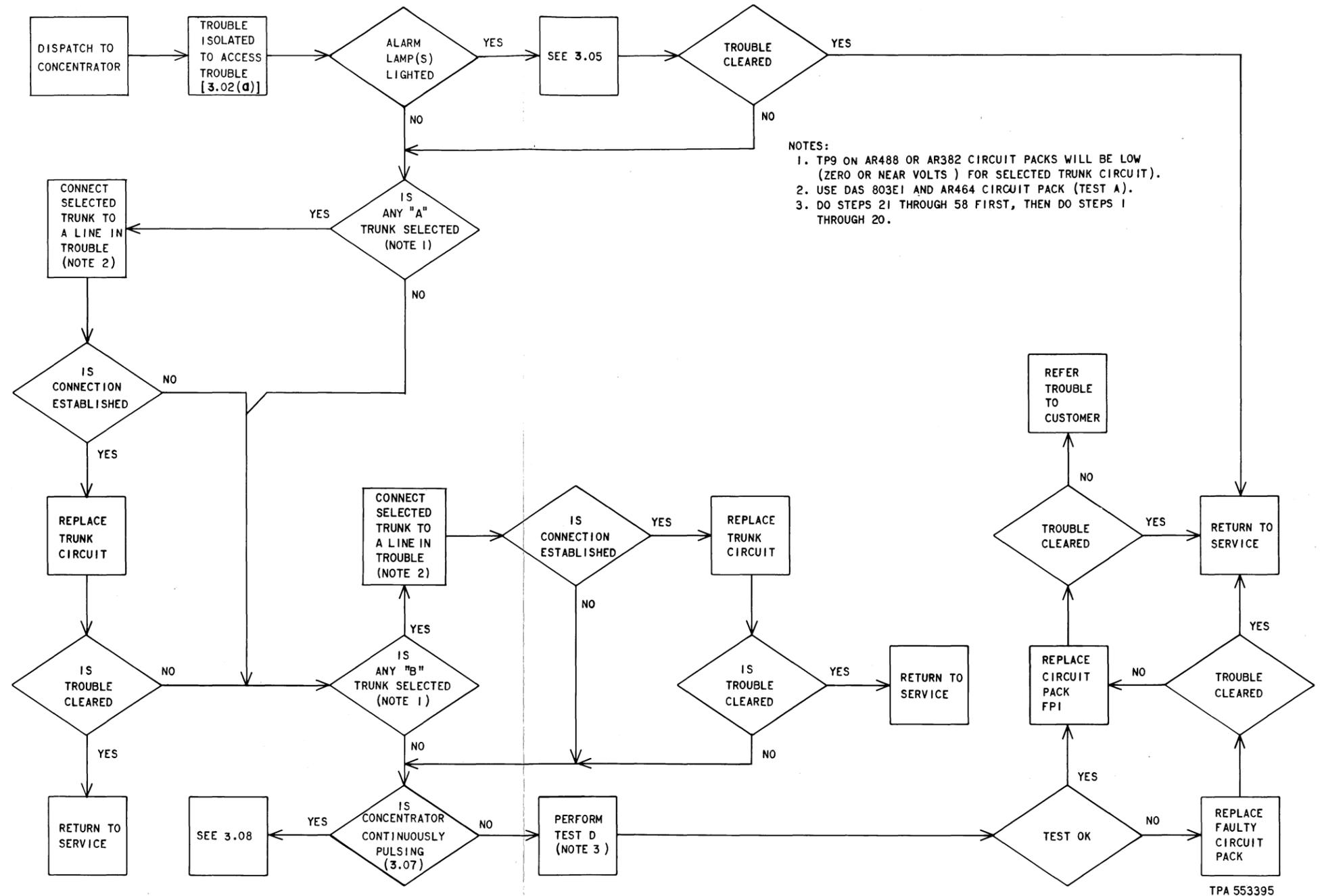
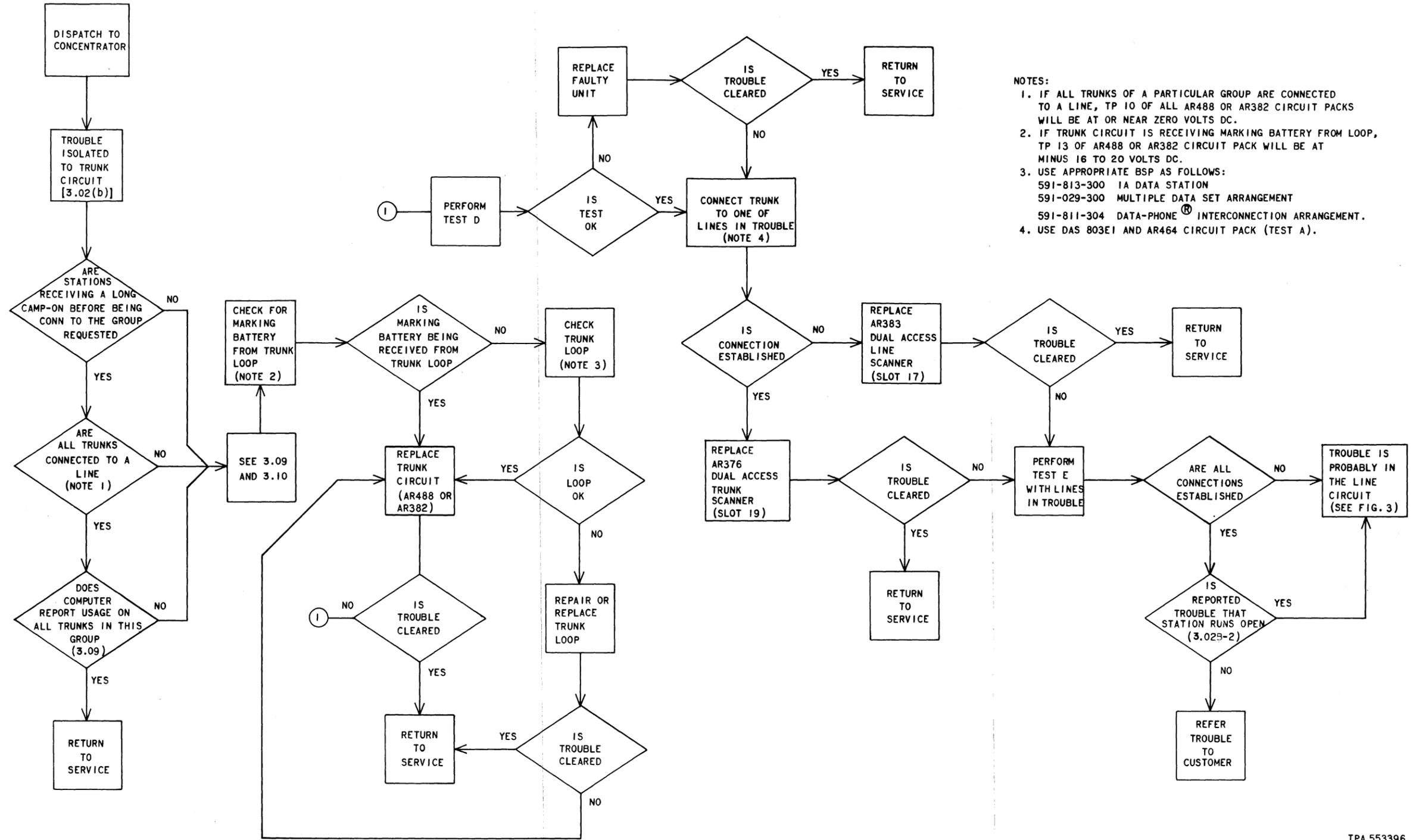


Fig. 1—Troubleshooting Flowchart for Access Troubles [3.02 (a)]



- NOTES:
1. IF ALL TRUNKS OF A PARTICULAR GROUP ARE CONNECTED TO A LINE, TP 10 OF ALL AR488 OR AR382 CIRCUIT PACKS WILL BE AT OR NEAR ZERO VOLTS DC.
 2. IF TRUNK CIRCUIT IS RECEIVING MARKING BATTERY FROM LOOP, TP 13 OF AR488 OR AR382 CIRCUIT PACK WILL BE AT MINUS 16 TO 20 VOLTS DC.
 3. USE APPROPRIATE BSP AS FOLLOWS:
 591-813-300 1A DATA STATION
 591-029-300 MULTIPLE DATA SET ARRANGEMENT
 591-811-304 DATA-PHONE INTERCONNECTION ARRANGEMENT.
 4. USE DAS 803E1 AND AR464 CIRCUIT PACK (TEST A).

Fig. 2—Troubleshooting Flowchart for Trunk Circuit [3.02 (b)]

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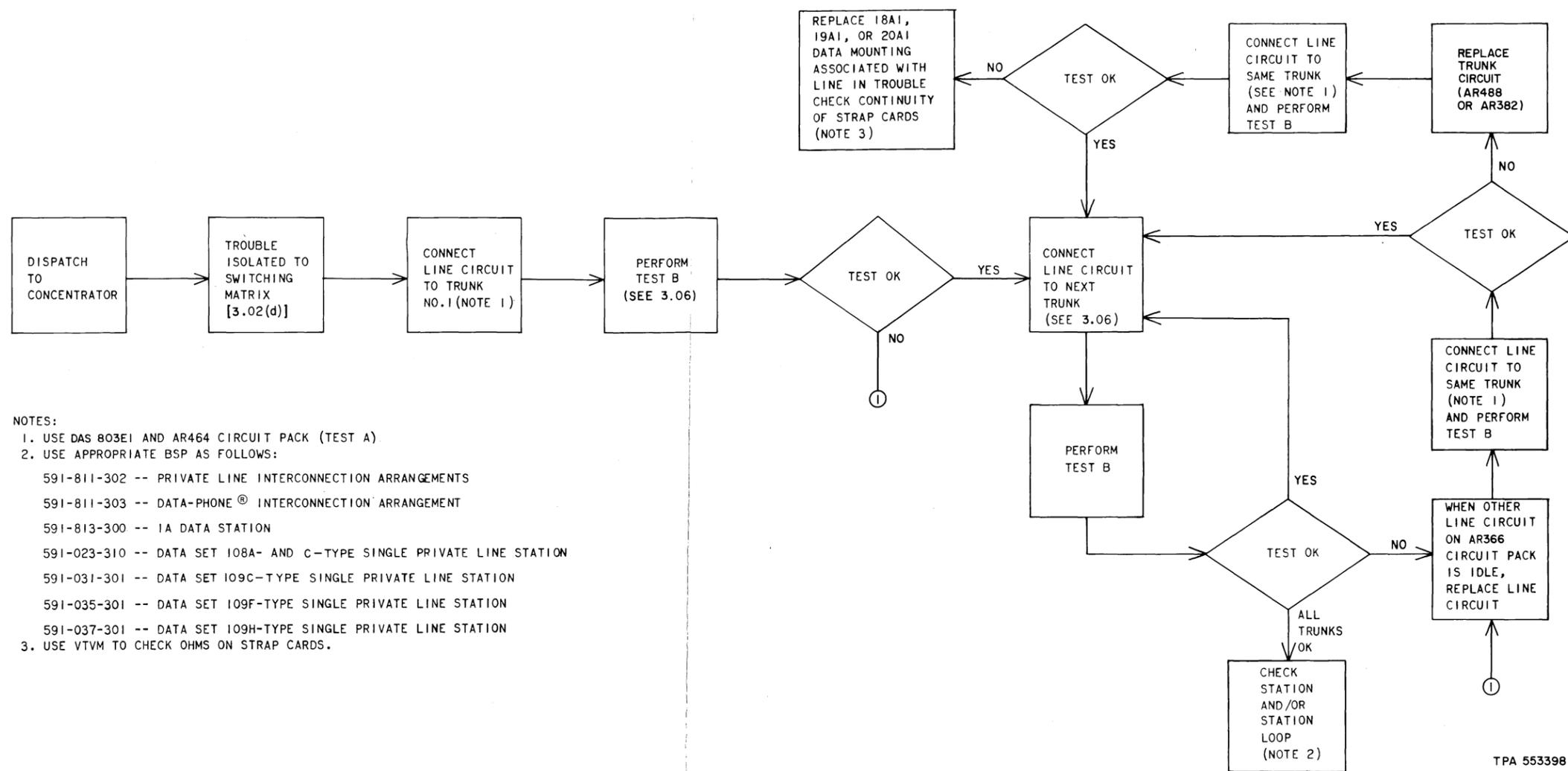


Fig. 4—Troubleshooting Flowchart for Switching Matrix [3.02 (d)]